

REMARKS

Claims 1-37 are pending in this application. Claims 11-25 and 29-37 are withdrawn from consideration. Claim 3 has been cancelled herein. Claims 1, 2, 26 and 27 have been amended herein. The amendments are based on cancelled claim 3.

Applicants' Response to Claim Rejections under 35 U.S.C. § 102(e)

Claims 1-2, 5-10 and 26-28 stand rejected under 35 U.S.C. 102(e) as being anticipated by Block et al. (US 6,737,728). In response thereto, applicants have amended Claims 1, 2, 26 and 27 to incorporate the limitation of claim 3. Applicants' respectfully submit that the rejection of these claims and their respective dependent claims is traversed by nature of this amendment. In regard to the dependent claims, applicants additionally submit as follows.

In regard to claim 6, there is no clear teaching in Block et al. that the barrier layer is amorphous. Block et al. discloses amorphous fluorinated carbons as a low dielectric constant material. See (3:13-19). Applicants respectfully submit that this disclosure is not related to the etch stop/barrier layer 258 cited by the Office Action for this limitation.

In regard to claim 8, the Office Action points to power 101 and ground 102 conductors of Figure 1 in Block et al. as an anticipatory disclosure. Applicants respectfully submit that conductors 101 and 102 are not "terminals for external electrical connection" as required by the claim. The specification of the present invention points to bumps 18 as terminals for electrical connection with a circuit board. See page 25, lines 30-33 of the specification. The conductors 101 and 102 of Blocks et al. do not illustrate a

similar disclosure. Further, the Office Action has not addressed the limitation “provided at least a location other than the edge of one side of the package.” This is a specific advantage of the present invention. See page 30, line 32 to page 31, line 8. Block et al. does not teach or suggest this limitation as the reference is concerned with interlayer decoupling capacitors.

In regard to claim 9, applicants respectfully submit that “a plurality of capacitors with different capacitances” is not disclosed. The Office Action points generally to FIG. 2 of Block et al. This is not a disclosure of capacitors with different capacitances, but a comparison of FIG. 1 which discloses a capacitor 100 next to a signal line 102. FIG. 2 illustrates two stacked capacitors side by side. See also (4:40-67). There is no discussion of the respective capacitance of the capacitors of FIG. 2 in Block et al.

The rejection of claim 10 is similar to that of claims 8 and 9. The Office Action asserts that 110 of FIG. 1 is an adhesion layer. There is however no disclosure in Block et al. of reference no. 110 as an adhesion layer. Rather, 110 is a dielectric layer. See (4:45-48).

Applicants’ Response to Claim Rejections under 35 U.S.C § 103(a)

Claims 3-4 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Block et al. (US 6,737,728) in view of Kirlin (US 6,072,689). As noted above, applicants have amended claims 1, 2, 26 and 27 to include the limitations of original claim 3. Applicants respectfully submit that there is not a proper *prima facie* case of obviousness within the meaning of §103 to cover the limitation from original claim 3 (i.e. “...the barrier layer is a material having the same thermal expansion coefficient as that of the

dielectric layer”).

First, neither Block et al. nor Kirlin disclose the limitation of original claim 3, now incorporated into amended claims 1, 2, 26 and 27. The present invention claims the barrier layer has the same thermal expansion coefficient as the dielectric layers. Neither Block et al. nor Kirlin disclose or discuss thermal expansion coefficients of layers at the capacitor.

According to the present invention, as the protective insulating layer and the internal capacitor are physically separated by the barrier layer, moisture released from the resin material of the protective insulating layer is prevented from reaching the metal oxide layer constituting the dielectric layer of the capacitor. As a result, it is possible to use as the protective insulating layer a cured resin material such as polyimide which absorbs mechanical stress from the bumps, while preventing reduction of the metal oxide dielectric layer material due to moisture released from the resin material. See page 14, lines 3-15 of the specification.

In addition, since the non-conductive inorganic material of the barrier layer has a thermal expansion coefficient equivalent to that of the dielectric layer, it is possible to avoid problems such as interlayer peeling that occurs due to mechanical stress under exposure to severe temperature fluctuations in the field. When the thermal expansion coefficient of the barrier layer and dielectric layer are equivalent and peeling is prevented, a thin layer capacitor with high reliability is obtained. See page 24, lines 5- 18 of the specification.

The Office Action points to column 5, lines 19-21 of Kirlin as disclosing the

limitation of applicants' original claim 3. However, this disclosure only states that various metal oxides may be used to form an oxygen diffusion barrier layer 62. There is no teaching or suggestion that an oxygen diffusion barrier layer 62 is equivalent to the etch stop layer 258 of Block et al. Block et al. forms its barrier layer 258 to stop the etching of copper. See (5:1-7) of Block et al. This is not related to an oxygen diffusion barrier. Hence, there is no teaching or suggestion in either reference which would lead one skilled in the art to make the combination.


In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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